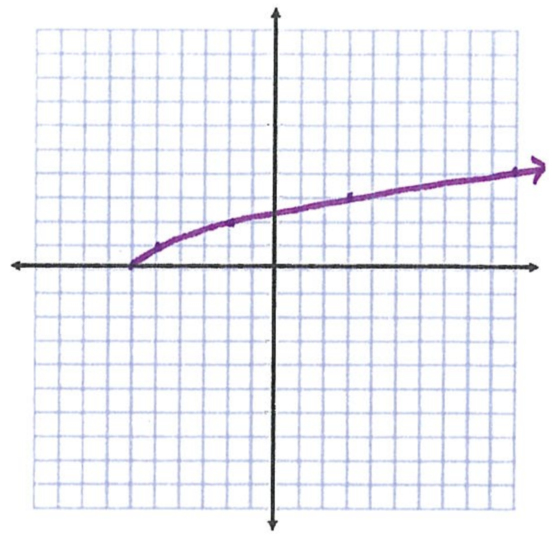
Mr. Michael T. Davis WLPCS Pre-Calculus	Units 1.9-1.11 Review for Final Exam May 15-17, 2018

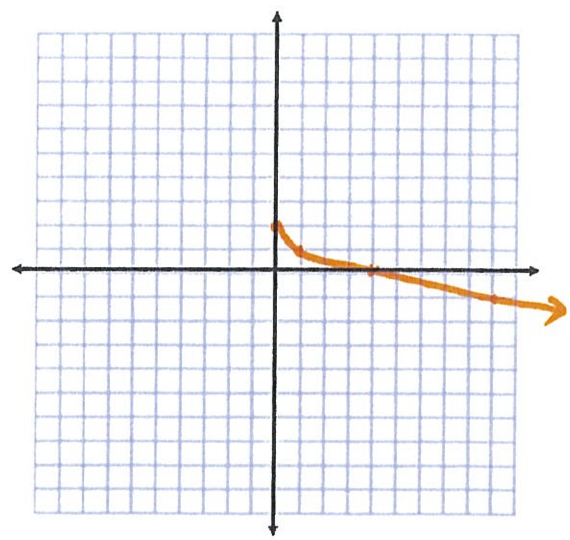
Name: Solutions / Answers

For #'s 1-12, neatly and carefully graph each transformation of a parent function:

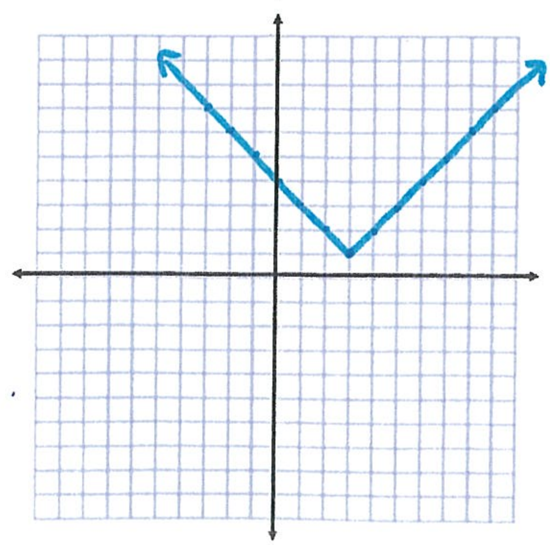
1. $f(x)=\sqrt{x+6}$ or $f(x)=(x+6)^{\frac{1}{2}}$



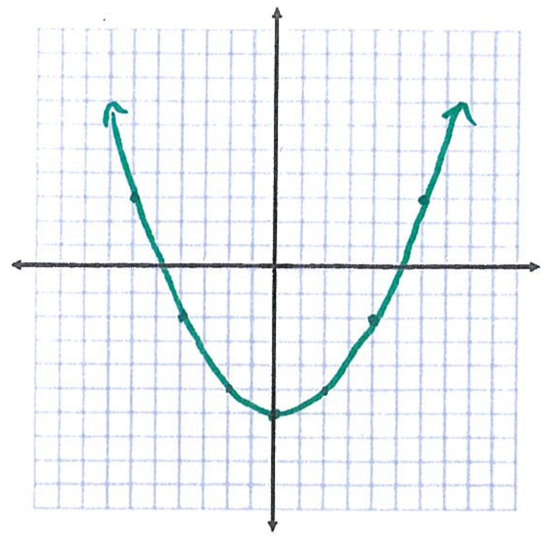
2. $f(x)=-\sqrt{x}+2$ or $f(x)=-(x)^{\frac{1}{2}}+2$



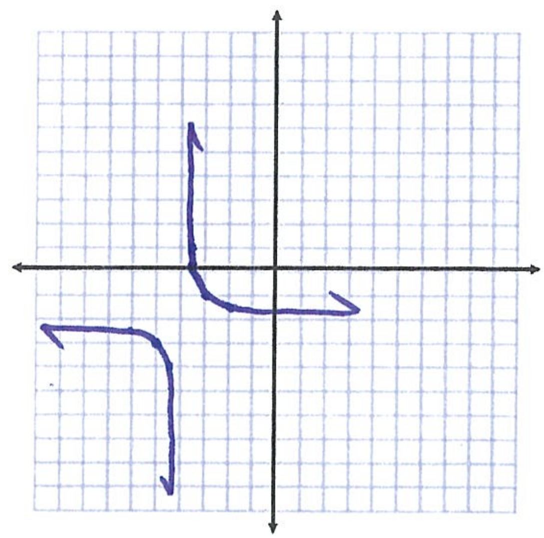
3. $f(x)=|x-3|+1$



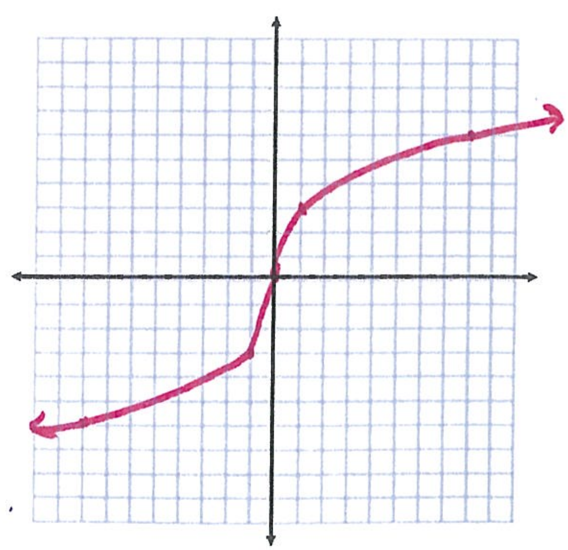
4. $f(x)=\left(\frac{1}{2}x\right)^2-6$



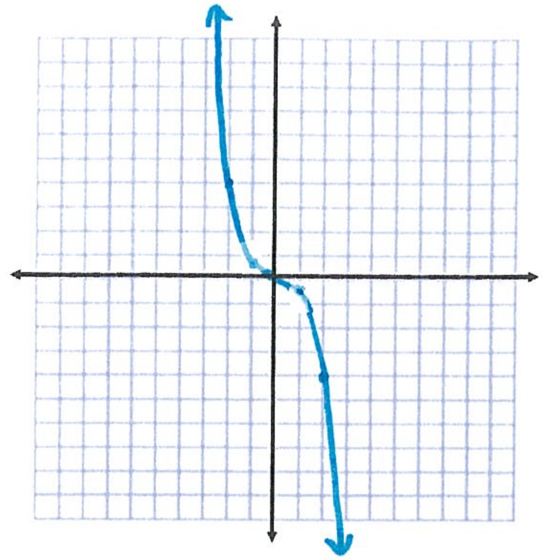
5. $f(x)=\frac{1}{x+4}-2$



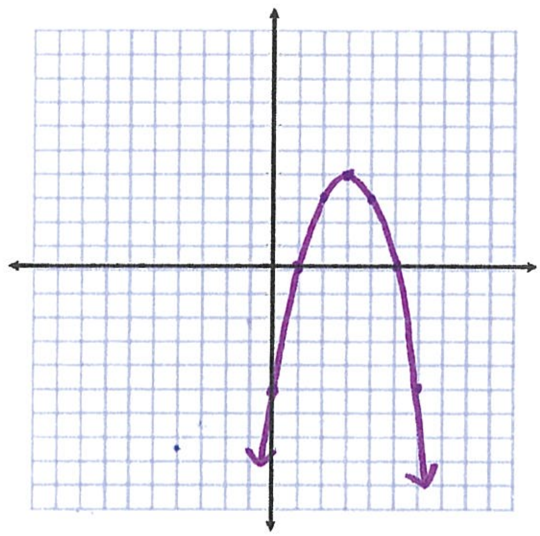
6. $f(x)=3\sqrt[3]{x}$ or $f(x)=3(x)^{\frac{1}{3}}$

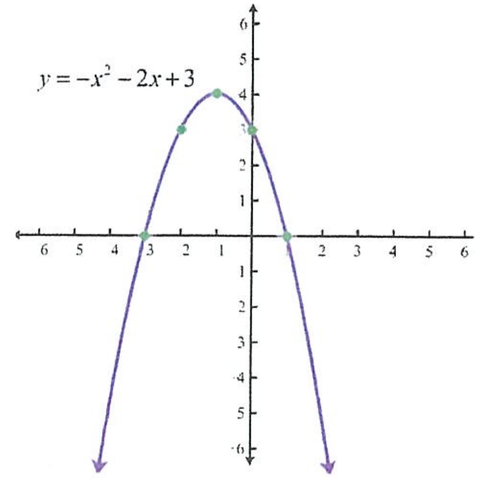


7. $f(x)=\frac{1}{2}(-x)^3$

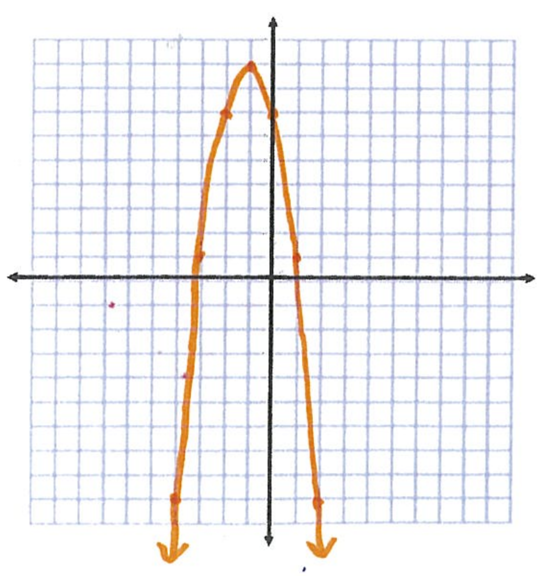


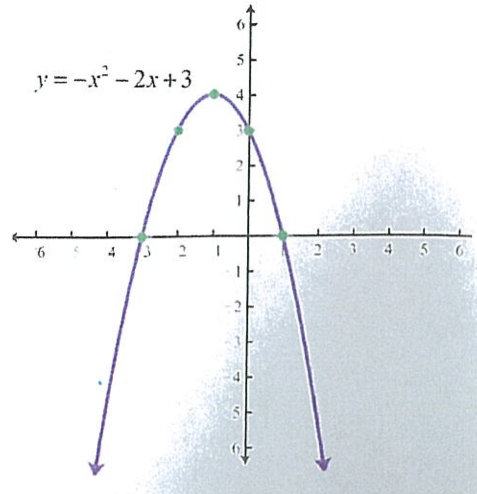
8. $T(x)=f(x-4)$



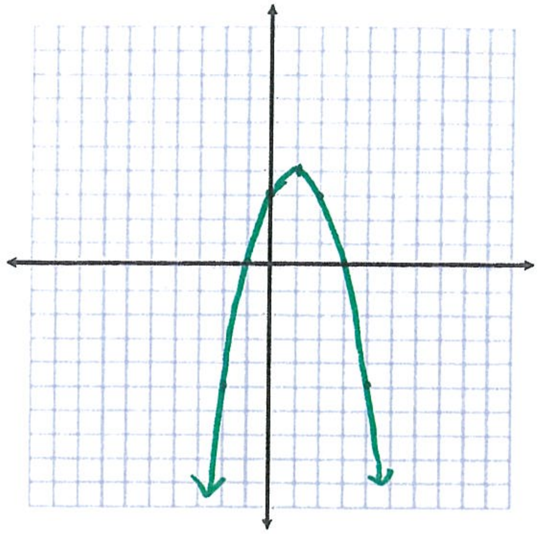


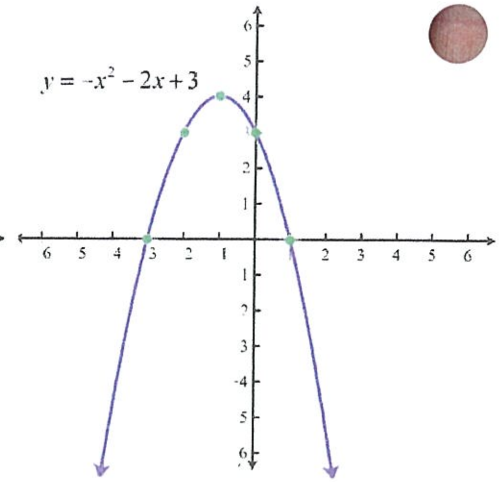
9. $T(x)=2f(x)+1$



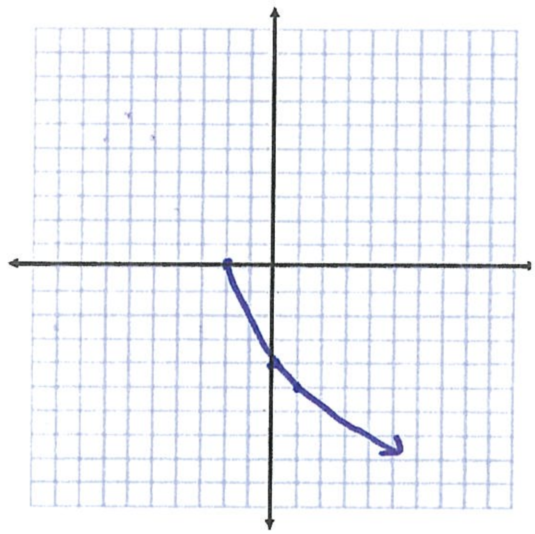


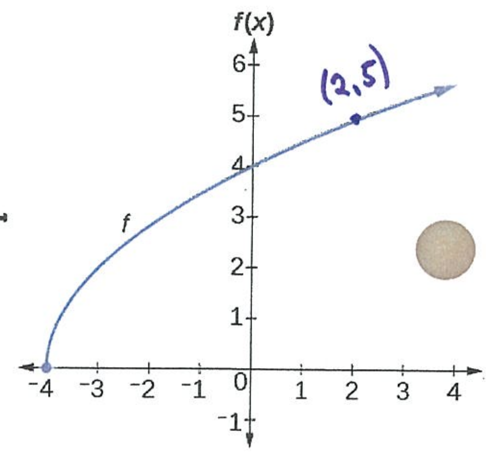
10. $T(x) = f(-x)$



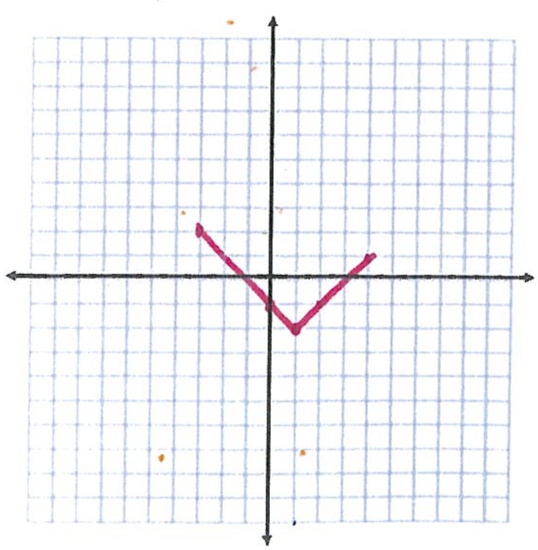


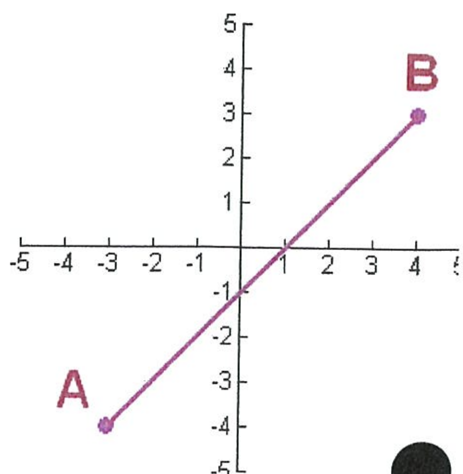
11. $T(x) = -f(2x)$





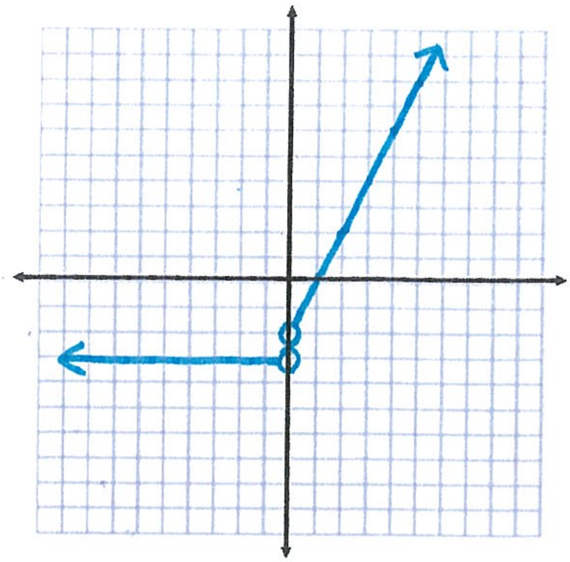
12. $T(x) = |f(x)| - 2$



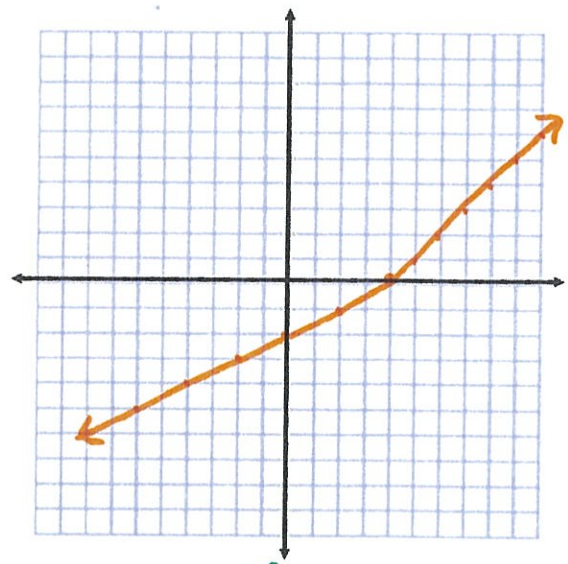


For #'s 13-15, neatly and carefully graph each piecewise function:

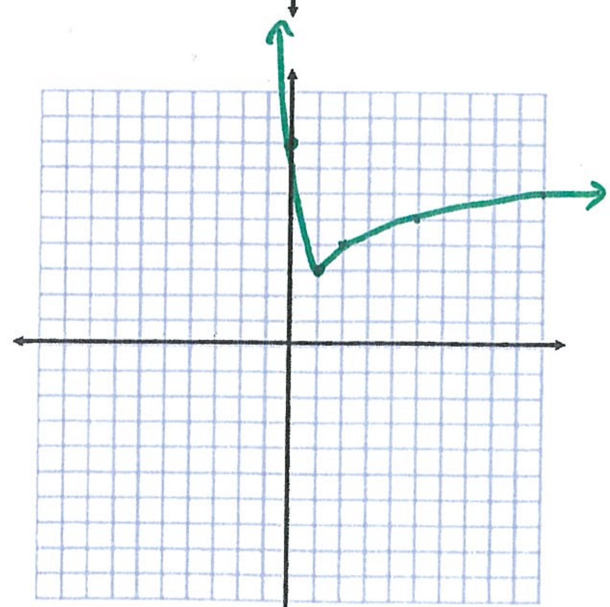
13. $f(x)=\begin{cases} 2x-2 & \text{if } x>0 \\ -3 & \text{if } x<0 \end{cases}$



14. $f(x)=\begin{cases} |x-4| & \text{if } x>4 \\ \frac{1}{2}x-2 & \text{if } x\le 4 \end{cases}$

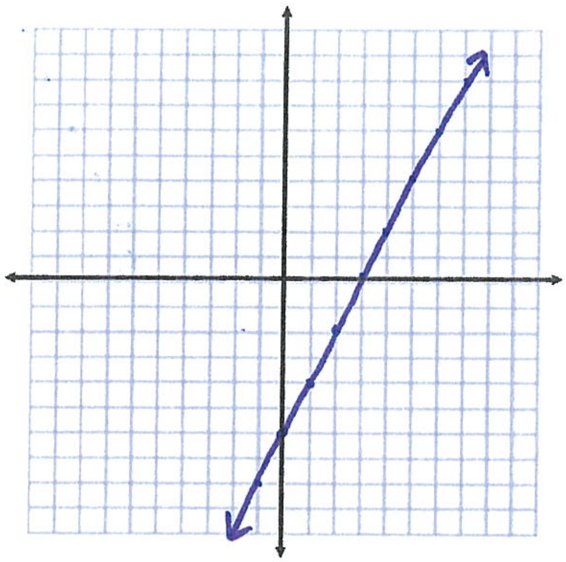


15. $f(x)=\begin{cases} (x-3)^2-1 & \text{if } x<1 \\ \sqrt{x-1}+3 & \text{if } x\ge 1 \end{cases}$

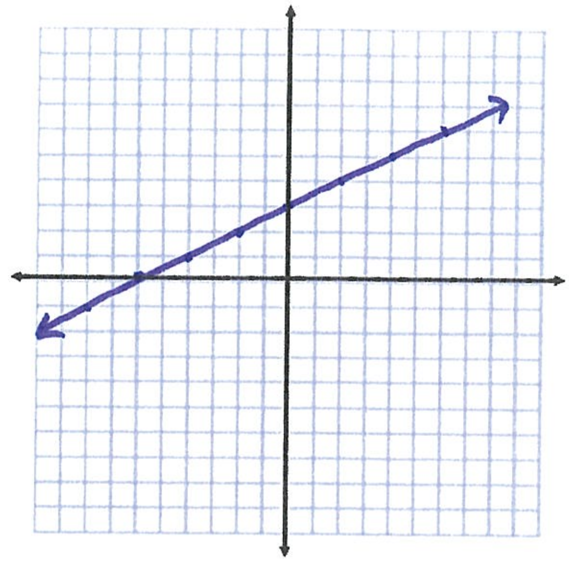


For #'s 16-18, neatly and carefully graph each original function and its inverse function:

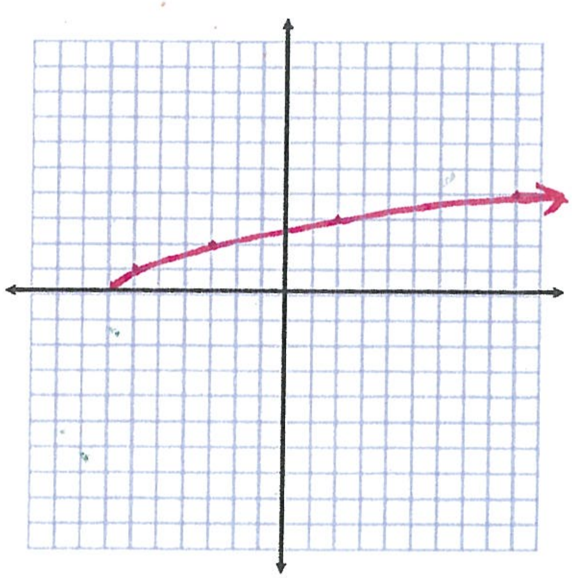
16. Graph $f(x) = 2x - 6$ on the grid below.



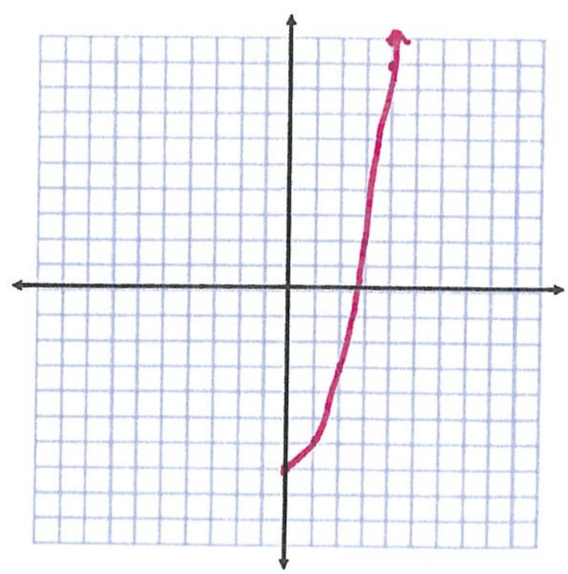
Graph the Inverse function below.



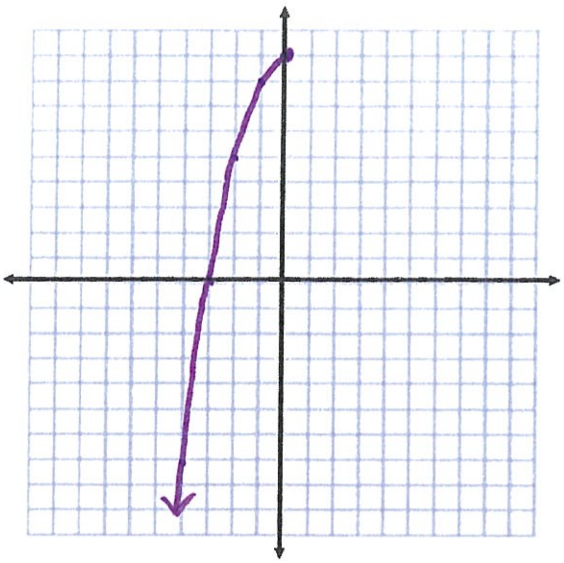
17. Graph $f(x) = \sqrt{x+7}$ on the grid below.



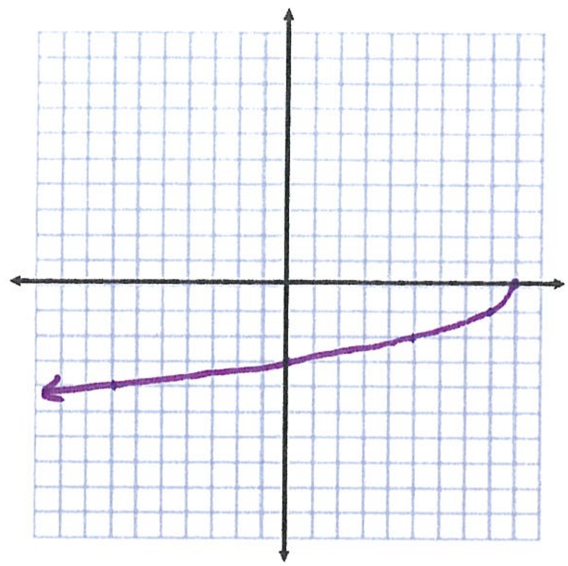
Graph the Inverse function below.



18. Graph $f(x)=9-x^2$ *if* $x \le 0$ on the grid below.



Graph the Inverse function below.



For #'s 19-21, determine an equation for the inverse function algebraically (pay special attention to the range of the original function because it gives you the domain of the inverse function)

19. $f(x)=2x-6$ Range: $(-\infty,\infty)$ $f^{-1}(x)=\frac{1}{2}x+3$

Domain: $(-\infty,\infty)$

$y=2x-6$

$x=2y-6$

$x+6=2y$

$\frac{x+6}{2}=y$ $y=\frac{1}{2}x+3$

20. $f(x)=\frac{3}{2}x+9$ Range: $(-\infty,\infty)$ $f^{-1}(x)=\frac{2}{3}x-6$

Domain: $(-\infty,\infty)$

$y=\frac{3}{2}x+9$

$x=\frac{3}{2}y+9$

$2x=3y+18$

$2x-18=3y$ $y=\frac{2}{3}x-6$

21. $f(x)=\sqrt{x+5}$ $f^{-1}(x)=x^2-5$

Domain: $x \ge 0$

$y=\sqrt{x+5}$ Range: $y \ge 0$

$x=\sqrt{y+5}$

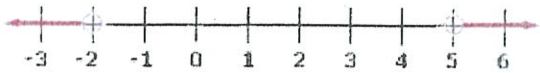
$x^2=y+5$

$x^2-5=y$

Mr. Michael T. Davis WLPCS Pre-Calculus	Units 1.1-1.8 Review for Final Exam May 14, 2018

Name: Solutions / Answers

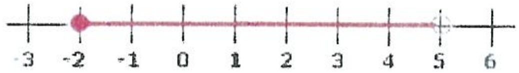
1. Write the domain of each graph in both **inequality** and **interval** notation.



Graph 1

Inequality: $x<-2$ or $x>5$

Interval: $(-\infty,-2)\cup(5,\infty)$



Graph 2

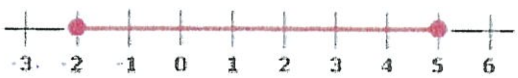
Inequality: $-2\le x<5$

Interval: $[-2,5)$

Graph 3

Inequality: $x\le-2$ or $x>5$

Interval: $(-\infty,-2]\cup(5,\infty)$

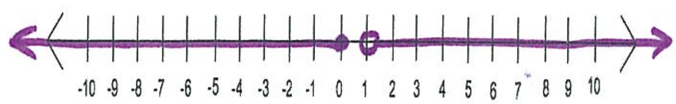


Graph 4

Inequality: $-2\le x\le 5$

Interval: $[-2,5]$

2. Graph the $(-\infty,0]\cup(1,\infty)$ interval on a number line

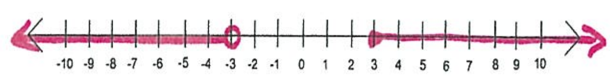


3. Solve each inequality. Graph the solution set on a number line, AND write the solution in interval notation.

a. $3-2x>9$ *or* $3x-4\ge5$

$-2x>6 \quad 3x\ge 9$

$x<-3 \quad x\ge3$



$(-\infty,-3)\cup[3,\infty)$

b. $-4\le\frac{1}{2}p-1<3$

$+1 \quad +1 \quad +1$

$-3\le\frac{1}{2}p<4$

$-6\le p<8$

$[-6,8)$

4. Write the inequalities $x < -6$ *or* $-1 \le x < 6$ in interval notation.

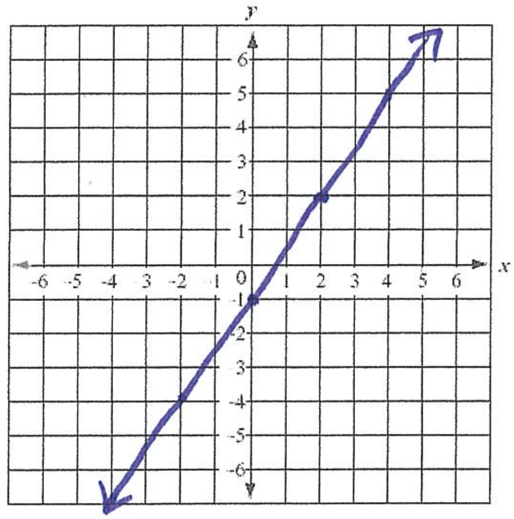
$(-\infty, -6) \cup [-1, 6)$

5. A rental car charge is \$100 per day plus \$0.20 per mile driven. Write an equation of the linear function that gives the total rental fee as a function of the number of miles driven in one day.

Let y = rental fee Let x = # of miles driven

$y = 0.20x + 100$

6. Graph the line with equation $y = \frac{3}{2}x - 1$



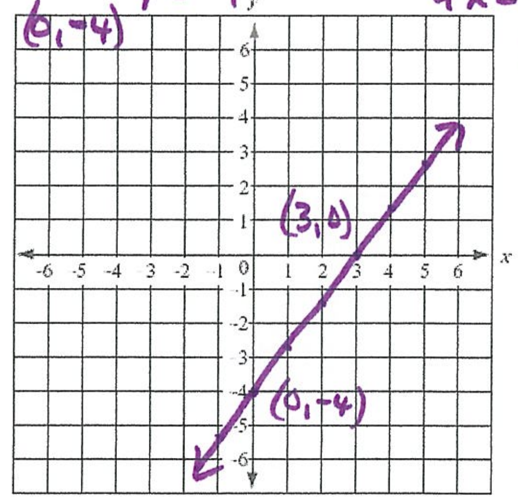
7. Graph the line with equation $4x - 3y = 12$

$4(0) - 3y = 12$ $4x - 3(0) = 12$

$y = -4$ $4x = 12$ $x = 3$

$(0, -4)$ $(3, 0)$

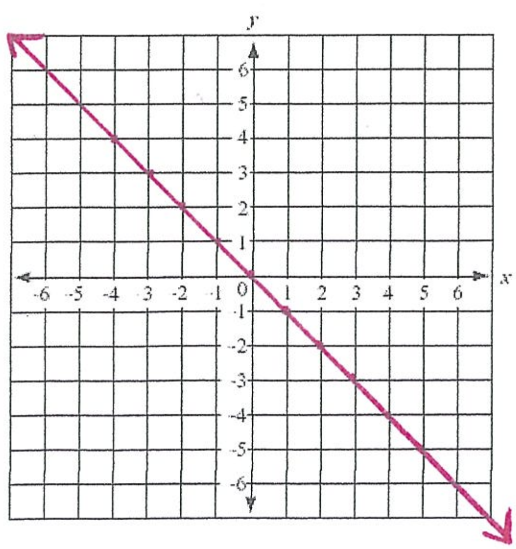
$m = \frac{4}{3}$

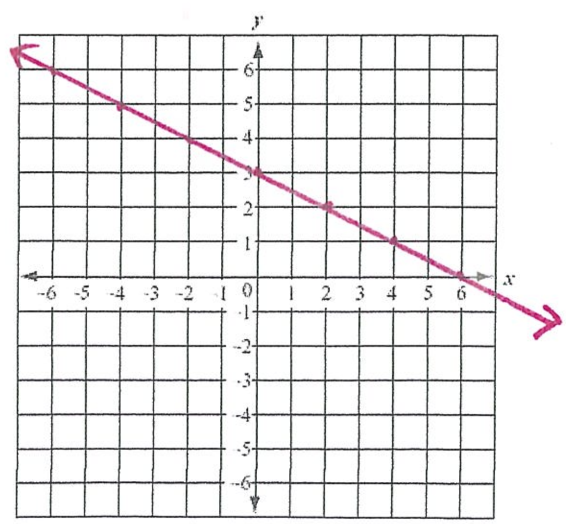


Given the lines shown, write an equation for each line in any form.

8. $y = -x$

9. $y = -\frac{1}{2}x + 3$





10. Given a line containing the points $(-4,2)$ and $(8,5)$. Find an equation of the line in slope-intercept form. Convert your equation to standard from.

$m = \frac{5-2}{8--4} = \frac{3}{12} = \frac{1}{4}$

$y = \frac{1}{4}x + b$

$(8,5)$ $5 = \frac{1}{4}(8) + b$

$5 = 2 + b$ $b = 3$

$y = \frac{1}{4}x + 3$

$4y = x + 12$

$4y - x = 12$

$-x + 4y = 12$

11. Line A has equation $y = \frac{-5}{3}x + 4$. Line B contains the point $(5,-4)$ and is perpendicular to line A. Determine an equation for line B.

line B: $y = \frac{3}{5}x + b$

$(5,-4)$ $-4 = \frac{3}{5}(5) + b$

$-4 = 3 + b$

$-7 = b$

$y = \frac{3}{5}x + -7$ $y = \frac{3}{5}x - 7$

For #'s 12-15, simplify each expression (do not leave any negative exponents):

12. $81^{\frac{1}{4}} =$ 3

13. $27^{\frac{4}{3}} =$ $(27^{\frac{1}{3}})^4 = (3)^4 = 81$

14. $\frac{y^2}{y^{-1}}$ $= y^2 \cdot y = y^3$

15. $(5x^2y^4)^2 - (2xy^2)^4$ $= 25x^4y^8 - 16x^4y^8 = 9x^4y^8$

16. Multiply $(x-7)^2$ $= (x-7)(x-7)$

$= x^2-7x-7x+49$

$= x^2-14x+49$

17. Multiply $(2x+5)(4x-3)$ $= 8x^2-6x+20x-15$

$= 8x^2+14x-15$

18. Factor $m^2-7m+10$ $= (m-2)(m-5)$

19. Factor $3x^2-5x-12$ $= (3x+4)(x-3)$

20. Solve $0=2y^2-14y$ $0=2y(y-7)$

$2y=0 \quad y-7=0$

$y=0 \quad y=7$

$\{0,7\}$

21. Convert the quadratic equation $f(x)=x^2+8x+11$ to vertex form

axis $x = \frac{-8}{2(1)} = -4$ $\quad f(-4)=(-4)^2+8(-4)+11=-5$

$V(-4,-5)$ $\quad y=(x+4)^2-5$

22. Convert the quadratic function $f(x)=2(x-1)^2-3$ to standard form

$f(x)=2(x-1)(x-1)-3$

$f(x)=2(x^2-2x+1)-3$

$f(x)=2x^2-4x+2-3$

$f(x)=2x^2-4x-1$

23. Graph $g(x)=x^2-4x-5$

$g(x)=(x-5)(x+1)$

$x=5$ $\quad$ $x=-1$

$(5,0)$ $\quad$ $(-1,0)$

axis $x=\frac{5+-1}{2}$

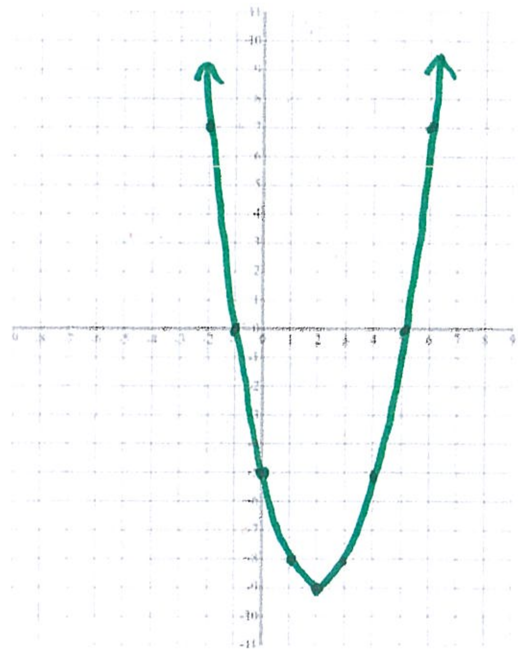
$x=2$

$g(2)=2^2-4(2)-5$

$g(2)=4-8-5$

$g(2)=-9$

$V(2,-9)$

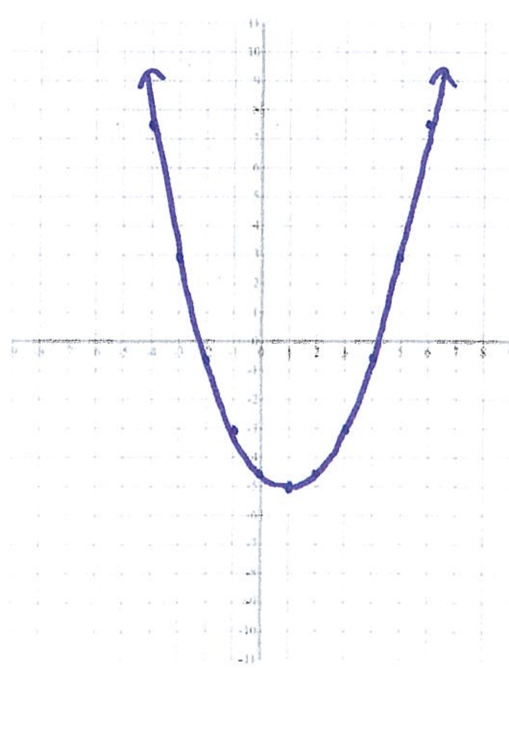


24. Graph $g(x)=\frac{1}{2}(x-1)^2-5$

$V(1,-5)$

Pattern

$\frac{1}{2}$ $\quad 1\frac{1}{2}$ $\quad 2\frac{1}{2}$ $\quad 3\frac{1}{2}$ $\quad 4\frac{1}{2}$



25. Determine the real zeros (x-intercepts) of the parabola with equation $f(x)=\frac{1}{4}(x-3)^2-5$.

$f(x)=0$

$0=\frac{1}{4}(x-3)^2-5$

$5=\frac{1}{4}(x-3)^2$

$20=(x-3)^2$

$\pm\sqrt{20}=\sqrt{(x-3)^2}$

$\pm2\sqrt{5}=x-3$

$3\pm2\sqrt{5}=x$

Zeros $x=3+2\sqrt{5}$ & $x=3-2\sqrt{5}$

x-intercepts $(3+2\sqrt{5},0)$ & $(3-2\sqrt{5},0)$

26. Determine the real zeros (x-intercepts) of the parabola with equation $g(x)=x^2-4x+1$

quadratic Formula $a=1$ $b=-4$ $c=1$

$x=\frac{4\pm\sqrt{(-4)^2-4(1)(1)}}{2(1)}$

$x=\frac{4\pm\sqrt{16-4}}{2}$

$x=\frac{4\pm\sqrt{12}}{2}$

$x=\frac{4\pm2\sqrt{3}}{2}$

$x=2\pm\sqrt{3}$

Zeros $x=2+\sqrt{3}$ & $x=2-\sqrt{3}$

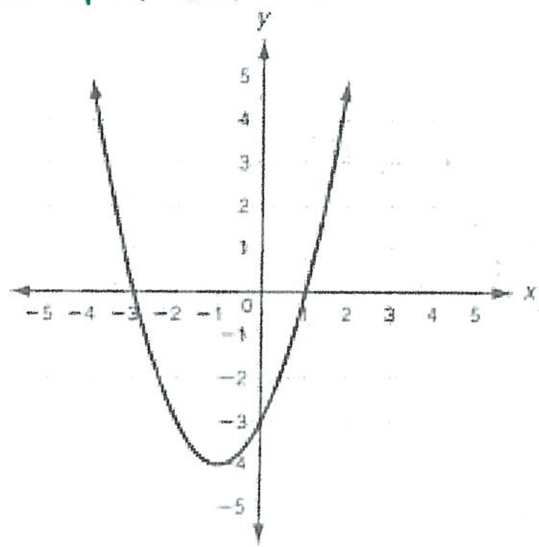
x-intercepts $(2+\sqrt{3},0)$ & $(2-\sqrt{3},0)$

27. For the parabola shown, write a quadratic equation in the form of your choice.

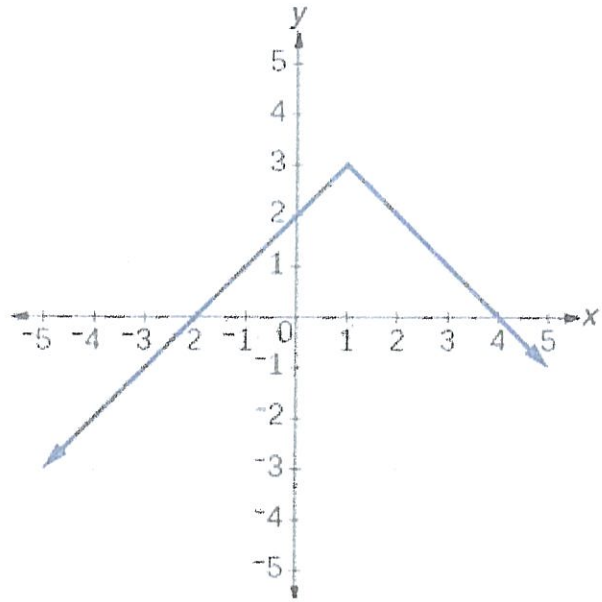
$V(-1,-4)$ Pattern $1,3,5,7,\ldots$

$y=(x+1)^2-4$

Vertex Form



Shown is the graph of $y = g(x)$



28. Evaluate: a. $g(0) =$ 2	b. $g(-4) =$ −2
29. Write the domain and range of the function using interval notation. D: $(-\infty, \infty)$ R: $(-\infty, 3]$	
30. State the interval(s) on which the function is: a. increasing $(-\infty, 1)$	b. decreasing $(1, \infty)$
31. State the interval(s) for which: a. $g(x) > 0$ $-2 < x < 4$	b. $g(x) < 0$ $x < -2$ or $x > 4$
32. State each value: a. the maximum value of $y = g(x)$ $y = 3$	b. the minimum value of $y = g(x)$ None
33. Solve $g(x) = -1$, i.e. for what value(s) of x does $g(x) = -1$ hold true? $x = -3$ and $x = 5$	
34. State the coordinates of each (approximate if necessary): a. any x-intercepts $(-2, 0)$ & $(4, 0)$	b. the y-intercept $(0, 2)$

Use for #'s 35-39, given the two functions $f(x)=2-x$ and $g(x)=x^2+x$:

35. Evaluate $g(x)-f(x)$

$x^2+x-(2-x)$

$x^2+x-2+x$

x^2+2x-2

36. Evaluate $f(x)\cdot g(x)$

$(2-x)(x^2+x)$

$2x^2+2x-x^3-x^2$

$-x^3+x^2+2x$

37. Evaluate $g(f(5))$ $= g(2-5) = g(-3) = (-3)^2+(-3) = 6$

38. Evaluate $f(g(x))$ $= f(x^2+x) = 2-(x^2-x) = 2-x^2+x$

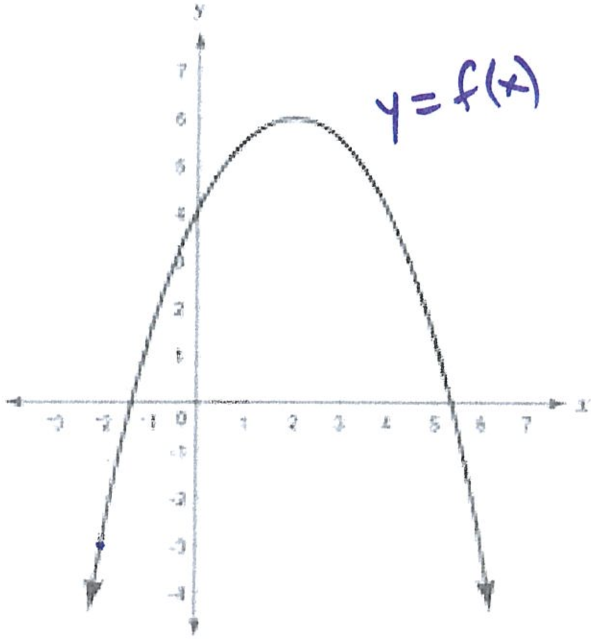
39. Evaluate $g(f(x))$ $= g(2-x) = (2-x)^2+(2-x)$

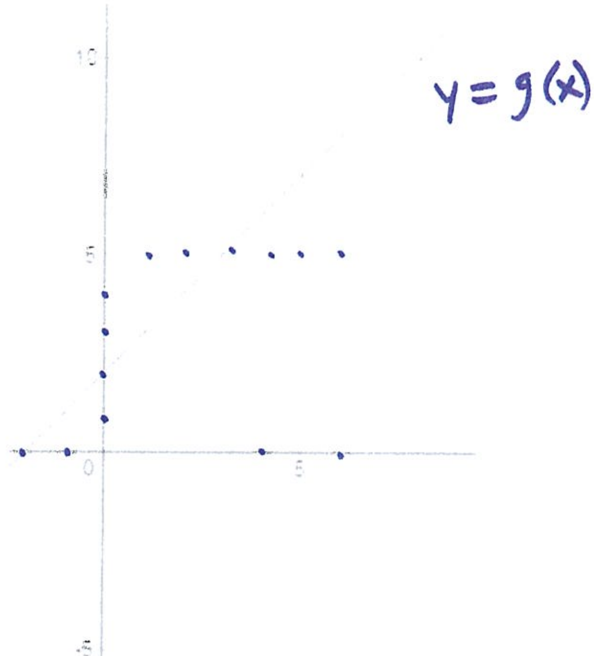
$= (2-x)(2-x)+(2-x)$

$= 4-2x-2x+x^2+2-x$

$= x^2-5x+6$

Use the graphs of $y=f(x)$ on the left and $y=g(x)$ on the right to answer questions # 40-43





40. Evaluate $g(f(2))$ $= g(6) = 5$

41. Evaluate $f(0)+g(0)$ $= 4$

42. Evaluate $f(-2)\cdot g(-2)$ $= (-3)(0) = 0$

43. Evaluate $\dfrac{g(2)}{f(2)}$ $= \dfrac{5}{6}$

Mr. Michael T. Davis WLPCS Pre-Calculus	Units 2.1-2.4 Review for Final Exam May 16-18, 2018

Name: Solutions / Answers

1. Factor $5y^2+12y+7$

$(5y+7)(y+1)$

2. Factor $14t^2+11t-15$

$(2t+3)(7t-5)$

3. Factor x^2-25

$(x-5)(x+5)$

4. Factor $n^2+8n+16$

$(n+4)(n+4)$

$(n+4)^2$

5. Factor $4w^2-20w+25$

$(2w-5)(2w-5)$

$(2w-5)^2$

6. Factor m^3-64

$(m-4)(m^2+4m+16)$

7. Factor $8k^3+27$ $= (2k)^3+3^3 = (2k+3)(4k^2-6k+9)$

8. Factor $8x^2 - 24x$ by factoring out the GCF initially

$\frac{8x^2}{8x} - \frac{24x}{8x}$ $\qquad \downarrow 8x$

$8x(x-3)$

9. Factor $5m^3 - 45m$ by factoring out the GCF initially

$\frac{5m^3}{5m} - \frac{45m}{5m}$ $\qquad \downarrow 5m$

$5m(m^2-9)$

$5m(m-3)(m+3)$

10. Factor $3y^3 + 6y^2 - 45y$ by factoring out the GCF initially

$\frac{3y^3}{3y} + \frac{6y^2}{3y} - \frac{45y}{3y}$ $\qquad \downarrow 3y$

$3y(y^2+2y-15)$

$3y(y-3)(y+5)$

11. Factor $4n^4 - 20n^3 - 56n^2$ by factoring out the GCF initially

$\frac{4n^4}{4n^2} - \frac{20n^3}{4n^2} - \frac{56n^2}{4n^2}$ $\qquad \downarrow 4n^2$

$4n^2(n^2 - 5n - 14)$

$4n^2(n-7)(n+2)$

12. Factor $\underline{x^3 + 5x^2} + \underline{4x + 20}$ by grouping

$x^2(x+5) + 4(x+5)$

$(x+5)(x^2+4)$

13. Factor $y^3 + 2y^2 - 9y - 18$ by grouping initially

$y^2(y+2) - 9(y+2)$

$(y+2)(y^2-9)$

$(y+2)(y-3)(y+3)$

14. Factor $z^4 - 13z^2 + 36$ $= (z^2-4)(z^2-9)$

$= (z-2)(z+2)(z-3)(z+3)$

15. Solve by factoring $3x^2 - 11x - 4 = 0$

$(3x+1)(x-4)=0$

$3x+1=0 \qquad x-4=0$

$3x=-1 \qquad x=4$

$x=\frac{-1}{3}$

Solution Set

$\{\frac{-1}{3}, 4\}$

16. Solve by factoring $x^2 - 81 = 0$

$(x-9)(x+9)=0$

Solution Set

$\{9, -9\}$

17. Solve by factoring $9k^2 - 49 = 0$

$(3k-7)(3k+7)=0$

$3k-7=0 \qquad 3k+7=0$

$k=\frac{7}{3} \qquad k=\frac{-7}{3}$

Solution Set

$\{\frac{7}{3}, \frac{-7}{3}\}$

18. Solve by factoring $p^2 - 20p + 100 = 0$

$(p-10)(p-10)=0$

$(p-10)^2=0$

$p-10=0 \quad p=10$

Solution Set

$\{10\}$

19. Solve by factoring $m^3 - 27 = 0$

$(m-3)(m^2+3m+9)=0$

$m-3=0$

$m=3$

$m=\frac{-3 \pm \sqrt{9-4(1)(9)}}{2(1)}$

$m=\frac{-3 \pm \sqrt{9-36}}{2}$

$m=\frac{-3 \pm \sqrt{-27}}{2}$

$m=\frac{-3 \pm 3i\sqrt{3}}{2}$

$\{3, \frac{-3+3i\sqrt{3}}{2}, \frac{-3-3i\sqrt{3}}{2}\}$

20. Solve by factoring $2m^3 - 32m = 0$

$2m(m^2-16)=0$

$2m(m-4)(m+4)=0$

$\downarrow \quad \downarrow \quad \downarrow$

$2m=0 \quad m-4=0 \quad m+4=0$

$m=0 \quad m=4 \quad m=-4$

Solution Set

$\{0,4,-4\}$

21. Solve by factoring $2x^2+10x+12=0$ by first factoring out the GCF

$2(x^2+5x+6)=0$

$2(x+2)(x+3)=0$

$x+2=0 \quad x+3=0$

$x=-2 \quad x=-3$

Solution Set

$\{-2,-3\}$

22. Solve by factoring $2y^3-6y^2-36y=0$ by first factoring out the GCF

$2y(y^2-3y-18)=0$

$2y(y-6)(y+3)=0$

$y=0 \quad y=6 \quad y=-3$

solution set

$\{0,6,-3\}$

23. Solve by factoring (by grouping) $y^3+2y^2-25y-50=0$

$y^2(y+2)-25(y+2)=0$

$(y+2)(y^2-25)=0$

$(y+2)(y-5)(y+5)=0$

$y=-2 \quad y=5 \quad y=-5$

Solution Set

$\{-2,5,-5\}$

24. Solve by factoring $z^4-20z^2+64=0$

$(z^2-4)(z^2-16)=0$

$(z-2)(z+2)(z-4)(z+4)=0$

$z=2 \quad z=-2 \quad z=4 \quad z=-4$

solution set

$\{2,-2,4,-4\}$

25. A polynomial function of degree 2 has the solution set $\{-8,5\}$. Determine an equation of the function in **standard form**.

$(x+8)(x-5)=0$

$x^2+3x-40=0$

26. A polynomial function of degree 3 has the solution set $\{2,-3\}$ with -3 as a double root. Determine an equation of the function in **standard form**.

$$(x-2)(x+3)(x+3)=0$$
$$(x-2)(x^2+6x+9)=0$$
$$x^3+4x^2-3x-18=0$$

27. A polynomial function of degree 3 has the solution set $\left\{0,-5,\frac{2}{3}\right\}$. Determine an equation of the function in **standard form**.

$x=0 \quad x=-5 \quad x=\frac{2}{3}$

$x=0 \quad x+5=0 \quad 3x-2=0$

$$x(x+5)(3x-2)=0$$
$$x(3x^2+13x-10)=0$$
$$3x^3+13x^2-10x=0$$

28. Solve $x^2+16=0$

$$x^2=-16$$
$$\sqrt{x^2}=\pm\sqrt{-16}$$
$$x=\pm i\sqrt{16}$$
$$x=\pm i\cdot 4$$

Solution set

$\{4i,-4i\}$

29. Solve $x^2-10=0$

$$x^2=10$$
$$\sqrt{x^2}=\pm\sqrt{10}$$
$$x=\pm\sqrt{10}$$

Solution set

$\{\sqrt{10},-\sqrt{10}\}$

30. Solve $k^2-12=0$

$$k^2=12$$
$$\sqrt{k^2}=\pm\sqrt{12}$$
$$k=\pm\sqrt{4\cdot 3}$$
$$k=\pm 2\sqrt{3}$$

Solution set

$\{2\sqrt{3},-2\sqrt{3}\}$

31. Solve $w^2 - 4w + 5 = 0$ using the quadratic formula

$$w = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(5)}}{2(1)}$$

$$w = \frac{4 \pm \sqrt{16-20}}{2}$$

$$w = \frac{4 \pm \sqrt{-4}}{2}$$

$$w = \frac{4 \pm 2i}{2}$$

$$w = 2 \pm i$$

Solution set

$\{2+i, 2-i\}$

32. Solve $k^3 + 64 = 0$ by factoring the sum of cubes and by using the quadratic formula

$$(K+4)(K^2 - 4K + 16) = 0$$

$K + 4 = 0$

$K = -4$

$$K = \frac{4 \pm \sqrt{16-64}}{2}$$

$$K = \frac{4 \pm \sqrt{-48}}{2}$$

$$K = \frac{4 \pm 4i\sqrt{3}}{2}$$

Solution set

$\{-4, 2+2i\sqrt{3}, 2-2i\sqrt{3}\}$

33. Solve $5m^3 + 45m = 0$ by factoring out the GCF and using other methods

$$5m(m^2+9) = 0$$

$5m = 0$

$m = 0$

$m^2 + 9 = 0$

$m^2 = -9$

$\sqrt{m^2} = \pm\sqrt{-9}$

$m = \pm 3i$

Solution set

$\{0, 3i, -3i\}$

34. Solve $2x^2 + 12x + 14 = 0$ by factoring out the GCF and using the quadratic formula

$$2(x^2 + 6x + 7) = 0$$

$a=1 \quad b=6 \quad c=7$

$$x = \frac{-6 \pm \sqrt{36-28}}{2}$$

$$x = \frac{-6 \pm \sqrt{8}}{2}$$

$$x = \frac{-6 \pm 2\sqrt{2}}{2}$$

$$x = -3 \pm \sqrt{2}$$

Solution set

$\{-3+\sqrt{2}, -3-\sqrt{2}\}$

35. Solve $x^3 + 3x^2 + 4x + 12 = 0$ by grouping initially

36. Solve $p^4+5p^2+4=0$

$(p^2+1)(p^2+4)=0$

$p^2+1=0 \quad p^2+4=0$

$p^2=-1 \quad p^2=-4$

$p=\pm i \quad p=\pm 2i$

$\{i, -i, 2i, -2i\}$ Solution set

37. Solve $z^4-8z^2+15=0$

$(z^2-3)(z^2-5)=0$

$z^2-3=0 \quad z^2-5=0$

$z^2=3 \quad z^2=5$

$z=\pm\sqrt{3} \quad z=\pm\sqrt{5}$

Solution set

$\{\sqrt{3}, -\sqrt{3}, \sqrt{5}, -\sqrt{5}\}$

38. A polynomial function has the solution set is $\{i, -i\}$ and has degree 2. Write an equation in standard form of the polynomial functions.

$(x-i)(x+i)=0$

$x^2+ix-ix-i^2=0$

$x^2-i^2=0$

$x^2+1=0$

39. A polynomial function has the solution set is $\{\sqrt{10}, -\sqrt{10}\}$ and has degree 2. Write an equation in standard form of the polynomial functions.

$(x-\sqrt{10})(x+\sqrt{10})=0$

$x^2+x\sqrt{10}-x\sqrt{10}-\sqrt{100}=0$

$x^2-10=0$

40. A polynomial function has the solution set is $\{0, 3i, -3i\}$ and has degree 3. Write an equation in standard form of the polynomial functions.

$x(x-3i)(x+3i)=0$

$x(x^2+3ix-3ix-9i^2)=0$

$x(x^2-9(-1))=0$

$x(x^2+9)=0$

$x^3+9x=0$

$\sqrt{-1} = i$

Mr. Michael T. Davis WLPCS Pre-Calculus	Units 2.5-2.7 Review for Final Exam May 21, 2018

Name: Solutions / Answers

1. Solve $x^2 + 16 = 0$

$x^2 = -16$

$\sqrt{x^2} = \pm\sqrt{-16}$

$x = \pm i\sqrt{16}$ $\quad x = \pm i4$

$\{4i, -4i\}$

2. Solve $k^3 - 5k = 0$

$k(k^2 - 5) = 0$

$k = 0 \quad k^2 - 5 = 0 \quad \sqrt{k^2} = \pm\sqrt{5}$

$k^2 = 5 \quad k = \pm\sqrt{5}$

$\{0, \sqrt{5}, -\sqrt{5}\}$

3. Solve $p^2 + 6p + 10 = 0$.

Quadratic Formula

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$p = \dfrac{-6 \pm \sqrt{6^2 - 4(1)(10)}}{2(1)}$

$p = \dfrac{-6 \pm \sqrt{36 - 40}}{2}$

$p = \dfrac{-6 \pm \sqrt{-4}}{2}$

$p = \dfrac{-6 \pm 2i}{2}$

$p = -3 \pm i$

$\{-3 + i, -3 - i\}$

4. Solve $x^3 - 2x^2 - 12x + 24 = 0$

$x^2(x-2) - 12(x-2) = 0$

$(x-2)(x^2 - 12) = 0$

$x - 2 = 0 \quad x^2 - 12 = 0$

$x = 2 \quad x^2 = 12 \quad \sqrt{x^2} = \pm\sqrt{12} \quad x = \pm 2\sqrt{3}$

$\{2, 2\sqrt{3}, -2\sqrt{3}\}$

5. Write an equation (in standard form) of the polynomial function with solution set $\{10i, -10i\}$ and with degree 2.

$i^2 = -1$

$(x - 10i)(x - -10i) = 0$

$(x - 10i)(x + 10i) = 0$

$x^2 + \cancel{10i} - \cancel{10i} - 100i^2 = 0$

$x^2 - 100(-1) = 0$

$x^2 + 100 = 0$

6. Write an equation (in standard form) of the polynomial function with solution set $\{-2, \sqrt{7}, -\sqrt{7}\}$ and with degree 3.

$$(x+2)(x-\sqrt{7})(x+\sqrt{7})=0$$
$$(x+2)(x^2+\cancel{\sqrt{7}x}-\cancel{\sqrt{7}x}-\sqrt{49})=0$$
$$(x+2)(x^2-7)=0$$
$$x^3+2x^2-7x-14=0$$

7. Simplify $\frac{8x+24}{4}$ $= 2x+6$

8. Simplify $\frac{2x^2-5x-12}{2x^2+13x+15}$ $= \frac{\cancel{(2x+3)}(x-4)}{\cancel{(2x+3)}(x+5)} = \frac{x-4}{x+5}$

9. Simplify $\frac{m^2-49}{m^2-14m+49} \cdot \frac{m^2-13m+42}{m^2+7m}$ $= \frac{\cancel{(m-7)}\cancel{(m+7)}}{\cancel{(m-7)}\cancel{(m-7)}} \cdot \frac{(m-6)\cancel{(m-7)}}{m\cancel{(m+7)}}$

$$= \frac{m-6}{m}$$

10. Simplify $\frac{p^3+1}{p^3-8} \div \frac{p+1}{p-2}$ $= \frac{\cancel{(p+1)}(p^2-p+1)}{\cancel{(p-2)}(p^2+2p+4)} \cdot \frac{\cancel{p-2}}{\cancel{p+1}} = \frac{p^2-p+1}{p^2+2p+4}$

11. Solve $\frac{5x-70}{x-14}=5$

$5x-70=5x-70$

$0=0$

All real numbers, $x \neq 14$

12. Solve $\frac{6x-78}{x-13}=7$

$6x-78=7x-91$

$13 \neq x$

No solution

13. Solve. $\frac{2}{3}=\frac{5w+4}{6+7w}$

$\frac{2}{\cancel{3}}(6+7w)\cancel{(3)} = \frac{5w+4}{\cancel{6+7w}}\cancel{(6+7w)}(3)$

$12+14w = 15w+12$

$0=w$

$\{0\}$ solution set

14. Solve $\frac{21}{h^2}-1=\frac{4}{h}$

$h^2\left(\frac{21}{h^2}\right) - h^2(1) = h^2\left(\frac{4}{h}\right)$

$21-h^2=4h$

$0=h^2+4h-21$

$0=(h+7)(h-3)$

$h=-7 \quad h=3$

$\{-7,3\}$ solution set

15. Solve $x = \frac{33}{x} - 8$

$$x(x) = x\left(\frac{33}{x}\right) - x(8)$$

$$x^2 = 33 - 8x$$

$$x^2 + 8x - 33 = 0$$

$$(x+11)(x-3) = 0$$

$$x = -11 \quad x = 3$$

$\{-11, 3\}$ solution set

16. Solve. $1 + \frac{2}{y} = \frac{4}{y-3}$

$$y(y-3)(1) + \cancel{y}(y-3)\left(\frac{2}{\cancel{y}}\right) = y\cancel{(y-3)}\left(\frac{4}{\cancel{y-3}}\right)$$

$$y^2 - 3y + 2y - 6 = 4y$$

$$y^2 - 5y - 6 = 0$$

$$(y-6)(y+1) = 0$$

$$y = 6 \quad y = -1$$

$\{6, -1\}$ solution set

17. Solve $\frac{2}{x+1} - \frac{1}{x} = \frac{1}{6}$

$$6x\cancel{(x+1)}\left(\frac{2}{\cancel{x+1}}\right) - 6\cancel{x}(x+1)\left(\frac{1}{\cancel{x}}\right) = \cancel{6}x(x+1)\left(\frac{1}{\cancel{6}}\right)$$

$$12x - 6x - 6 = x^2 + x$$

$$0 = x^2 - 5x + 6$$

$$0 = (x-2)(x-3)$$

$$x = 2 \quad x = 3$$

$\{2, 3\}$ solution set